

Bat Survey of the Sioux District, Custer National Forest: 1994



A Report to:

USDA Forest Service

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March 1995

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ABSTRACT

Eight species of vespertilionid bats were identified during field surveys on the Sioux District, Custer National Forest in June and September 1994. Most of the 18 sites surveyed were associated with water (springs, reservoirs, beaver ponds, stock ponds). Species identified were long-eared myotis (*Myotis evotis*), western small-footed myotis (*M. ciliolabrum*), long-legged myotis (*M. volans*), fringed myotis (*M. thysanodes*), silver-haired bat (*Lasionycteris noctivagans*), big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), and Townsend's big-eared bat (*Plecotus townsendii*). The literature on the bat fauna of the Sioux District includes one species not detected in 1994, little brown myotis (*Myotis lucifugus*) (Andersen and Jones 1971, Jones *et al.* 1973). Most *Myotis* species cannot be distinguished with bat detectors (the primary survey tool in 1994), so *M. lucifugus* may actually have been present (unidentified *Myotis* species were detected at nine sites). *M. thysanodes* (an adult non-lactating female), caught in a mist net in the Slim Buttes, is a new species recorded for the area.

Current lists include 2 bat species from Chalk Buttes, 7 species from Ekalaka Hills, 8 species from the Long Pines, 6 species from North Cave Hills, 3 species from South Cave Hills, and 9 species from Slim Buttes; no survey work was conducted in Chalk Buttes in 1994. Only the list from Slim Buttes includes all species known to occur on Sioux District lands. Only *Eptesicus fuscus* has been recorded from each of the six main units of the Sioux District; with the exception of *M. thysanodes*, all other species have been detected on at least three of the six units.

Seven species are known to breed on the Sioux District, based on males with enlarged testes, lactating females, or females with embryos. One other species (*Plecotus townsendii*) was present at sites in the Ekalaka Hills, Long Pines, North Cave Hills, and Slim Buttes during the breeding season, is known to breed in the Black Hills to the south, and probably breeds in the area. Only *M. thysanodes*, which also breeds in the Black Hills, is of uncertain status on the Sioux District at this time. Currently, nothing is known about which species overwinter on the Sioux District.

TABLE OF CONTENTS

ABSTRACT	iii
ACKNOWLEDGMENTS	v
INTRODUCTION	1
METHODS	2
RESULTS AND DISCUSSION	4
Species Present on the Sioux District, Custer National Forest	7
Long-eared Myotis (<i>Myotis evotis</i>)	7
Western Small-footed Myotis (<i>Myotis ciliolabrum</i>)	9
Little Brown Myotis (<i>Myotis lucifugus</i>)	11
Long-legged Myotis (<i>Myotis volans</i>)	13
Fringed Myotis (<i>Myotis thysanodes</i>)	15
Silver-haired Bat (<i>Lasionycteris noctivagans</i>)	17
Big Brown Bat (<i>Eptesicus fuscus</i>)	19
Hoary Bat (<i>Lasiurus cinereus</i>)	21
Townsend's Big-eared Bat (<i>Plecotus townsendii</i>)	23
Species Not Located but Potentially Present on the Sioux District, Custer National Forest	24
Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	24
Red Bat (<i>Lasiurus borealis</i>)	24
Spotted Bat (<i>Euderma maculatum</i>)	24
RECOMMENDATIONS	26
BIBLIOGRAPHY	27
APPENDIX B1. Field forms used in bat inventories.	31
APPENDIX B2. Sites surveyed for bats on the Sioux District, Custer National Forest ...	36
APPENDIX B3. Locations of bat species detected during 1994 field survey	38
APPENDIX B4. Known distribution of bat species on the Sioux District	41



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INTRODUCTION

As demands for resources and recreational opportunities increase on public lands, managers will be pressed to make wise decisions about the relative merits of each in context of the entire biotic and physiographic system. How disturbance is likely to affect animal and plant populations forms the basis for management plans, which must begin with an inventory of species present. Bats are one of several groups which must be considered. Five species of vespertilionid bats (*Myotis evotis*, *M. ciliolabrum*, *M. volans*, *M. thysanodes*, and *Plecotus townsendii*) found in northwestern South Dakota and southeastern Montana are on the U. S. Fish and Wildlife Service list of candidate species Category 2 (C-2), including one species (*P. townsendii*) listed by the U. S. Forest Service as Sensitive.

Knowledge about the distribution, habitat requirements, and movements of bats in western North America is fragmentary. In the Northern Great Plains, study efforts on bat populations have generally been concentrated in areas with a relative abundance of caves: for instance, the Black Hills of South Dakota (Turner 1974, Turner and Davis 1970). Nevertheless, there remains much to be learned about basic distribution, seasonality of occurrence, habitat use, and population status of most species.

In the summer of 1994, a survey of bats occurring on the Sioux District, Custer National Forest in Carter County, Montana, and Harding County, South Dakota, was initiated to determine presence and distributions on the different forest units. The results of this survey, along with data published previously, are presented here and should form the basis for further inventory and monitoring efforts.

METHODS

Historical records of bats from Carter County, Montana and Harding County, South Dakota, obtained from the literature (see Bibliography), provide data on breeding status, habitat use, seasonality of occurrence, and distribution. Museum records, other than those previously published, are not included here.

Field work in 1994 was conducted in mid-June and late September. An attempt was made to visit the six main units of the Sioux District (Chalk Buttes, Ekalaka Hills, Long Pines, North Cave Hills, South Cave Hills, Slim Buttes). However, time and weather precluded survey efforts in the Chalk Buttes. Most survey sites were chosen based on accessibility and the presence of water, as bats tend to concentrate their foraging activity over water sources where insects are abundant (all bats in this region are insectivorous). No potential roost sites (caves, mines, cavities in trees) were visited or checked, despite the presence of several in the region.

Two methods were employed to detect bats; mist nets and ultrasound bat detectors. Thomas and West (1989) provide a general discussion of sampling methods. Each method has strengths and weaknesses for survey work, with neither one being definitive. Mist-netting has the advantage of allowing in-hand identification of individuals and collection of data on sex and reproductive condition, neither of which are obtainable with bat detectors. Some bats may not get captured in nets, however, and species present at a particular site may go undetected. Detectors can determine the presence of species of bats that may be missed during mist-netting, but they are not without drawbacks besides those already mentioned. Call duration, time between calls, call structure, and call frequency can vary significantly with habitat and between individuals (Erickson 1993), which can cause make species identifications difficult. On the Sioux District, *Myotis evotis* was the only species of *Myotis* which could be accurately distinguished using a bat detector. Ideally, a combination of mist-nets and bat detectors would be employed at a given site in order to obtain the most accurate picture of distribution.

In the 1994 survey, mist nets were set up at dusk adjacent to feeding and/or drinking sites at ponds and springs and left in place for 30- 120 min. Captured individuals were identified, sexed, examined for reproductive condition, measured for morphometric data (see data forms, Appendix B1), and released. Sites were never sampled on consecutive evenings.

Microchiropteran bats use a variety of ultrasonic vocalizations as echolocation aids for navigation and prey capture. Fortunately, several studies have determined that the signals emitted by many species of bats can be used as species-specific signatures (e.g., Barclay 1986, Fenton and Bell 1981, Fenton *et al.* 1983, MacDonald *et al.* 1994). This characteristic permits the assessment of species-presence during inventory work through use of portable ultrasound bat detectors. ANABAT II bat detectors (Titley Electronics, Ballina, Australia) were used during the 1994 field season. These detectors are sensitive to broadband ultrasonic calls common in bat vocalizations (usually 20-180 kHz). Ultrasonic signals in the range of bat vocalizations are captured, converted to an audible frequency (up to 10 kHz), and recorded on magnetic tape. Detector units (consisting of the detector, timer/tape-driver, and a cassette tape recorder) were set up before dusk near bodies of water and rims where bat activity would be expected, and left in place overnight; usually one cassette tape was sufficient to record

activity at a single site, since the recorders used were voice-activated. Detectors were sensitive to bats within a minimum range of 20 m. Tapes were returned to the laboratory and analyzed on an IBM compatible PC using an ANABAT II ZCA Interface Module and software. Assignment of vocalizations to a particular species of bat was achieved by matching field recordings with a reference set of calls obtained from captured individuals, in addition to matching call characteristics with those available in the current literature.

Locations of Bat Surveys on or near the Sioux Division, Custer National Forest



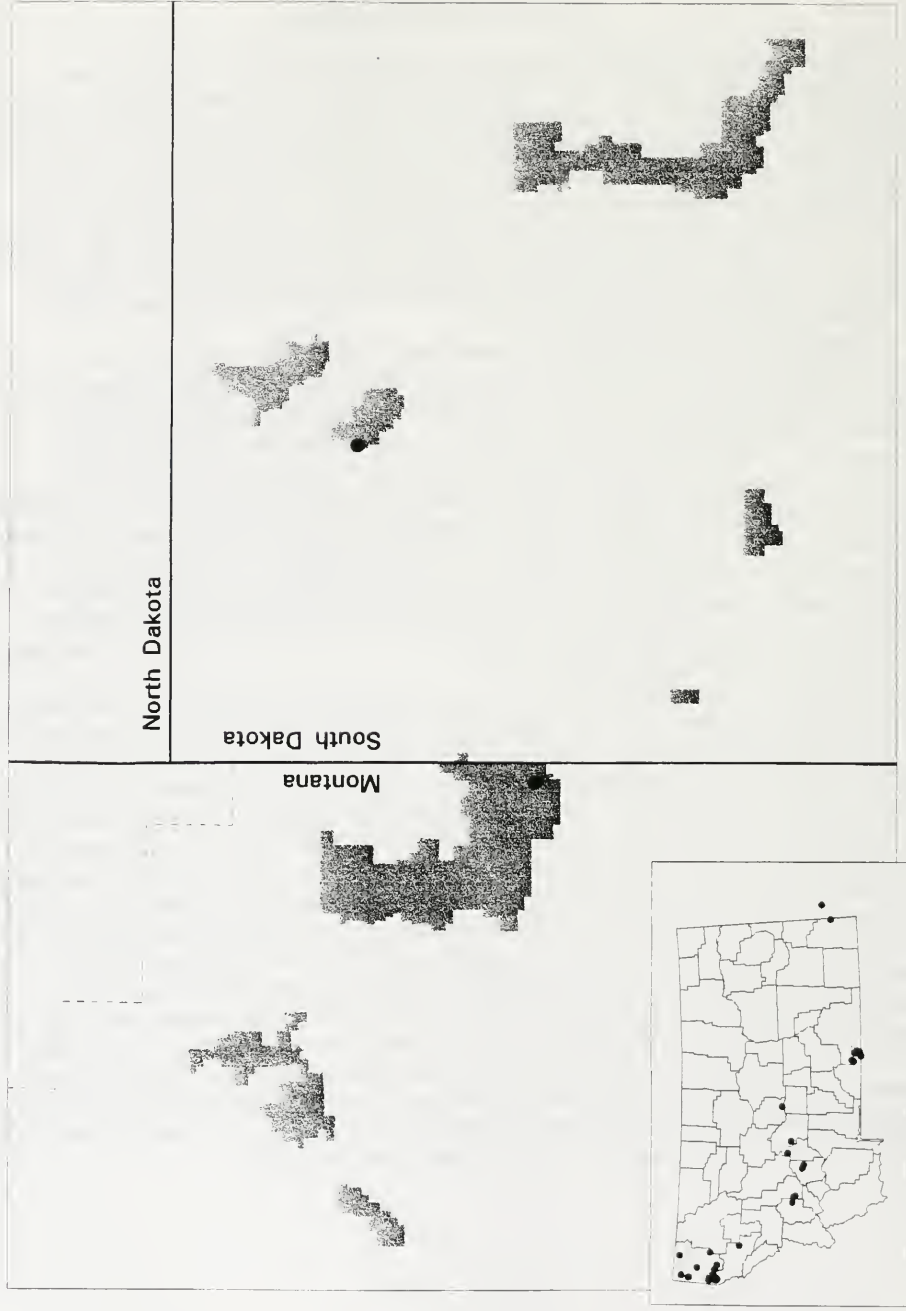
RESULTS AND DISCUSSION

Eighteen sites were surveyed during 1994: 10 sites in mid-June and 8 sites in late September (see Appendix B2). All main units of the Sioux District were sampled, with the exception of Chalk Buttes: 2 sites in Ekalaka Hills, 4 sites in the Long Pines, 6 sites in North Cave Hills, 2 sites in South Cave Hills, and 4 sites in Slim Buttes. All sites were sampled with ultrasound bat detectors, and three of these sites (one in North Cave Hills and two in Slim Buttes) were sampled with mist nets as well (Appendix B2). Bats were detected at 13 (72%) of the sites, 12 of 18 sites using bat detectors and 2 of 3 sites using mist nets. A mean of 2.7 ± 1.5 species were detected at sites where bats were present; the largest number of species at a single site (6 at Reva Gap Campground, Slim Buttes) were detected using a combination of bat detectors and mist nets.

Eight species of vespertilionid bat (common names follow Jones *et al.* 1986) were identified during 1994 field surveys (see Appendix B3): Long-eared Myotis (*Myotis evotis*; 2 sites), Western Small-footed Myotis (*M. ciliolabrum*; 1 site), Long-legged Myotis (*M. volans*; 2 sites), Fringed Myotis (*M. thysanodes*; 1 site), Silver-haired Bat (*Lasionycteris noctivagans*; 4 sites), Big Brown Bat (*Eptesicus fuscus*; 10 sites), Hoary Bat (*Lasiurus cinereus*; 2 sites), and Townsend's Big-eared Bat (*Plecotus townsendii*; 4 sites). Unidentified *Myotis* sp. were detected at 9 sites. The Little Brown Myotis (*M. lucifugus*) has been reported previously but was not identified in 1994; because of the difficulty of distinguishing the species of *Myotis* on calls alone, and the presence of unidentified *Myotis* at nine sites, this species may well have been present. The Fringed Myotis (an adult non-lactating female) represents a new species reported for the Sioux District. Thus, the total number of bat species known to occur on the Sioux District is nine.

Current lists (see Appendix B4) include 2 bat species from Chalk Buttes, 7 species from Ekalaka Hills, 8 species from the Long Pines, 6 species from North Cave Hills, 3 species from South Cave Hills, and 9 species from Slim Buttes. Only Slim Buttes includes all species known to occur on Sioux District lands, and only the Big Brown Bat has been found in all six main units of the Sioux District. With the exception of the Fringed Bat, all other species have been detected on at least three of the six units. Seven species (*M. evotis*, *M. ciliolabrum*, *M. lucifugus*, *M. volans*, *L. noctivagans*, *E. fuscus*, *L. cinereus*) are known to breed on the Sioux District. This knowledge is based on males with enlarged testes, lactating females, or females with embryos. *P. townsendii* was present at a number of sites during the breeding season, is known to breed in the Black Hills to the south (Turner 1974, Turner and Davis 1970), and probably breeds in the area. Only *M. thysanodes*, which also breeds in the Black Hills, is currently of uncertain status on the Sioux District. Nothing is known, however, about which species overwinter on the Sioux District. Two, perhaps three, additional species may appear in the area: the Northern Long-eared Myotis (*Myotis septentrionalis*), the Red Bat (*Lasiurus borealis*), and possibly the Spotted Bat (*Euderma maculatum*). Species accounts follow, which summarize distributional and life history information for all (detected and potential) species on the Sioux District. Distribution maps show results of the 1994 survey.

Occurrences of *Myotis evotis* on or near the Sioux Division, Custer National Forest



Species locations from the Montana Natural Heritage Program, May 16, 1995

Species Present on the Sioux District, Custer National Forest

Long-eared Myotis (*Myotis evotis*)

Description: The ears of this bat are heavily pigmented (black and opaque) and are the longest (17-25 mm) of any American myotis; when pressed forward, ears extend >5 mm beyond the nose. Fur is long and glossy above, paler below. Posterior border of the uropatagium lacks a conspicuous fringe of hair. Weighs 6-8 g.

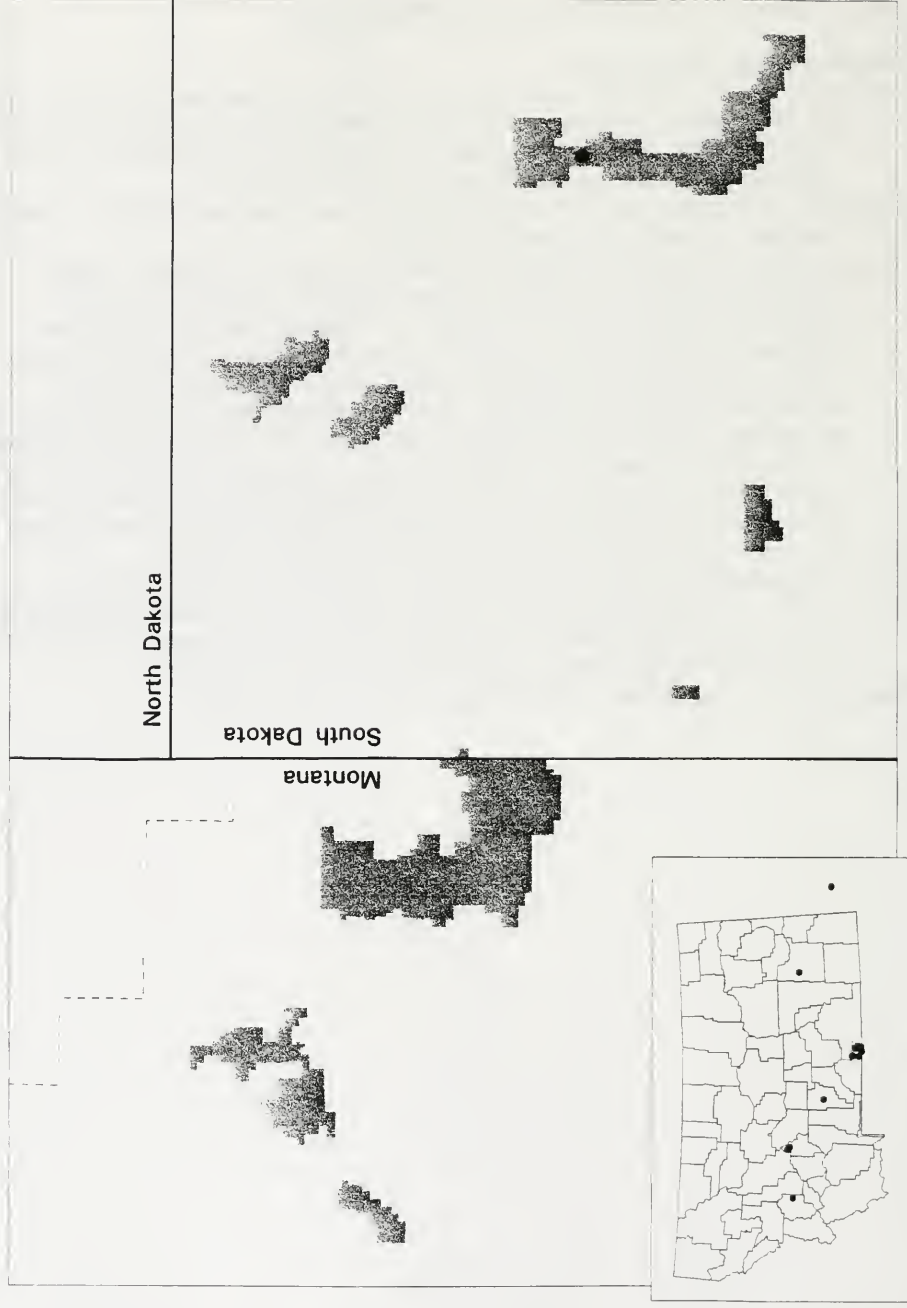
Distribution: Ranges over much of the western North America from southern Canada south to New Mexico, Arizona, and southern California.

Habitat and Habits: This species is especially common in ponderosa pine habitat, locally associated with pine-covered buttes and other broken terrain. Uses sheds, cabins, caves, and abandoned mines for roosting sites; hibernacula are poorly known, but abandoned coal mines have been used in northeastern Montana (Swenson and Shanks 1979). Females apparently form small maternity colonies, though this is poorly documented. Females with embryos and males with enlarged testes have been collected in late June to early July in Carter County, MT (Jones *et al.* 1973); females in late May to mid-June carried embryos in Harding County, SD (Andersen and Jones 1971). This species is often encountered at late dusk hunting among trees and over water. In 1994, this species was detected on 15 June at Wickham Campground in the Long Pines and on 28 September on a rim edge in the South Cave Hills (Appendix B3).

Status: Considered fairly common on the Sioux District (Andersen and Jones 1971, Jones *et al.* 1973). This species has been recorded from Chalk Buttes, Ekalaka Hills, the Long Pines, South Cave Hills, and Slim Buttes (Appendix B4). The Long-eared Myotis is a U. S. Fish and Wildlife Service candidate (C2) species for federal listing.

Natural Heritage Program rank: G5; S4 in Montana, S1 in South Dakota.

Occurrences of *Myotis ciliolabrum* on or near the Sioux Division, Custer National Forest



Species locations from the Montana Natural Heritage Program, May 16, 1995

atlas/maps/bat19.cmp

Western Small-footed Myotis (*Myotis ciliolabrum*; formerly *M. leibii ciliolabrum*)

Description: This is the smallest (3-7 g) bat in the area. Dorsal pelage is pale yellowish brown to golden brown, contrasting with the blackish ears (13-15 mm) and membranes. The most notable characteristic other than small size is the strongly-keeled calcar (the spur projecting from the ankle which supports the uropatagium).

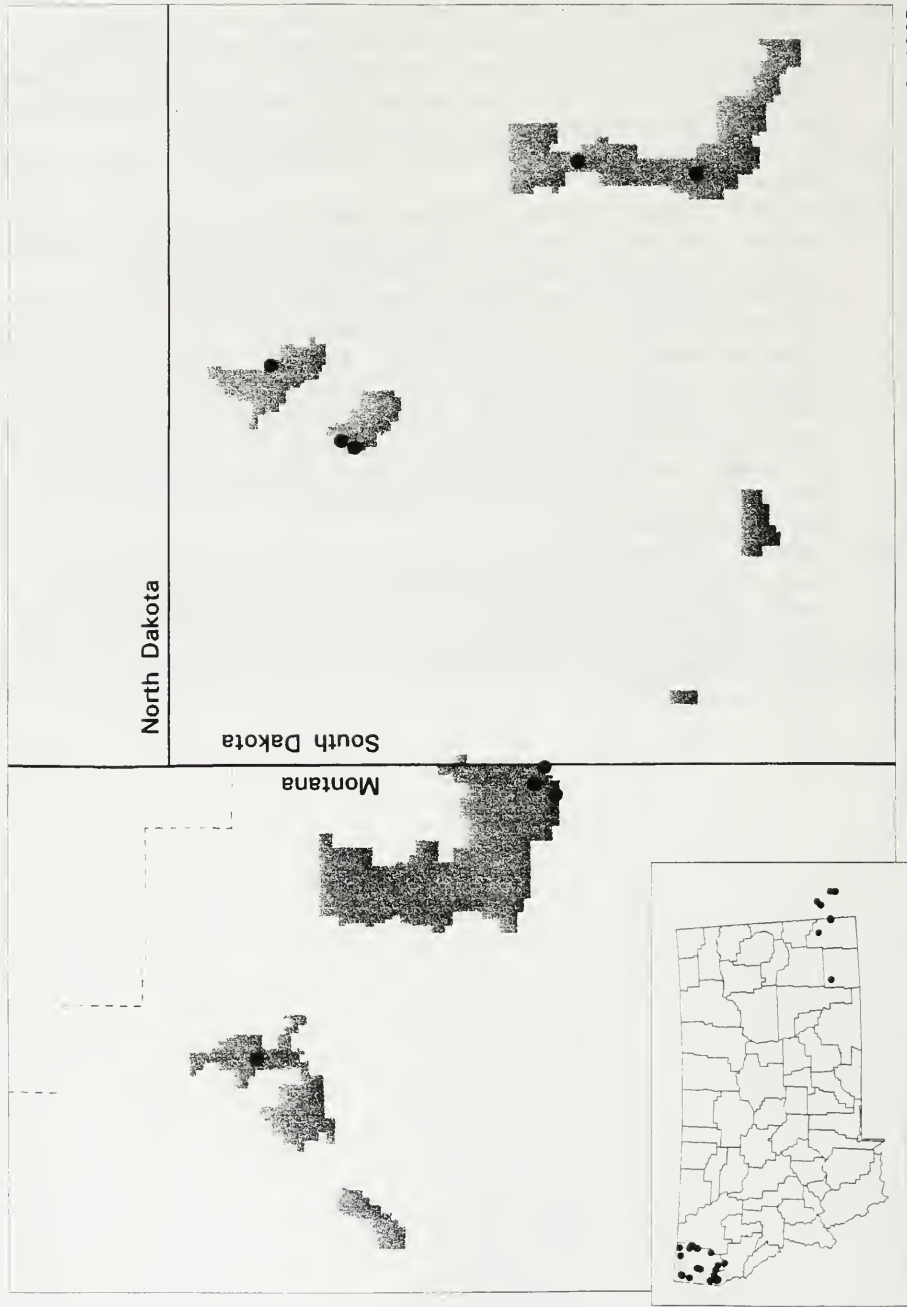
Distribution: Ranges over much of western North America from southern Canada to northern Mexico.

Habitat and Habits: Appears to prefer arid habitats, where it is associated with cliffs, talus, clay buttes, and steep riverbanks. Roosts in crevices in buildings, trees, rock faces, and clay banks, and may use spaces under and between talus and boulders. Hibernacula include caves and abandoned mines in central Montana (Swenson 1970), the Black Hills, SD (Turner 1974), and Idaho (Genter 1986). Tends to become active at dusk and forages low along cliffs and rocky slopes rather than over water. Little information is available on reproduction. One of six females collected in the Long Pines in late June to early July carried an embryo (Jones *et al.* 1973), a lactating female was collected in Ekalaka Hills on 18 July (Lampe *et al.* 1974), and females with embryos have been found in mid-June in the Black Hills (Turner 1974). In 1994 2 adult males and a juvenile male were mist-netted on 14 June at a pond at Reva Gap, Slim Buttes (Appendix B3).

Status: Appears to be fairly common on the Sioux District (see Andersen and Jones 1971, Jones *et al.* 1973). This species has been recorded from Ekalaka Hills, the Long Pines, and Slim Buttes (Appendix B4). The Western Small-footed Myotis is a U. S. Fish and Wildlife Service candidate (C2) species for federal listing.

Natural Heritage Program rank: G5; S4 in Montana, not on South Dakota Species of Special Concern list.

Occurrences of *Myotis* spp. on or near the Sioux Division, Custer National Forest



Species locations from the Montana Natural Heritage Program, May 16, 1995

Little Brown Myotis (*Myotis lucifugus*)

Description: Dorsal color is dark brown to buffy brown, often with a metallic coppery sheen; ears (13-15 mm) are about the same color as the dorsum and rounded. The tragus is relatively short and blunt. The uropatagium and wings are naked except along the proximal margins. The calcar is not keeled. Weighs 5-9 g.

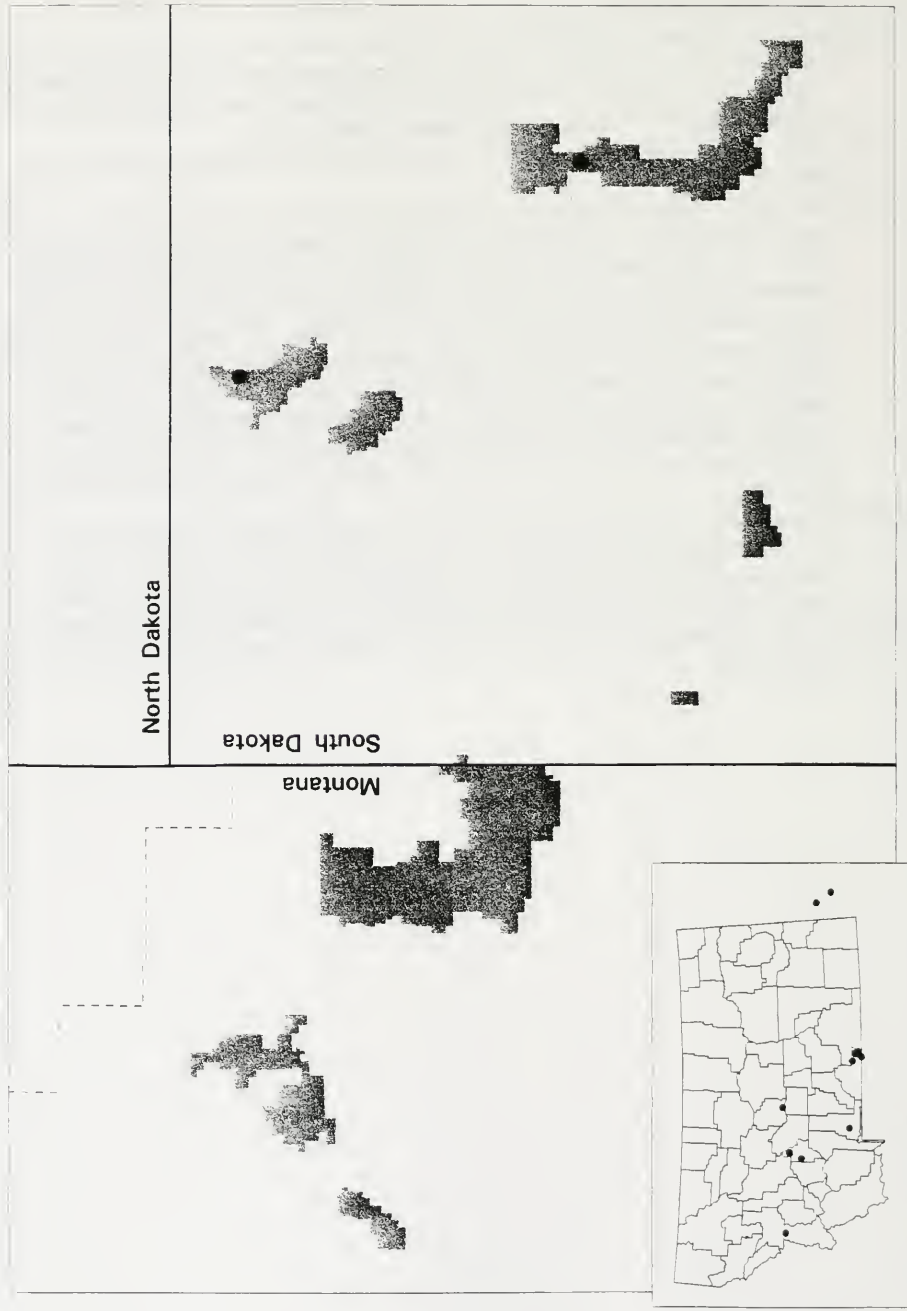
Distribution: From central Alaska south and east through most of Canada and the United States to central Mexico.

Habitat and Habits: Widely distributed in a variety of habitats, but usually near water. Day roosts include caves, under bark, and in buildings. Hibernacula include caves and mines. Two were found hibernating in December near Sidney in eastern Montana (Swenson and Shanks 1979); however, most individuals probably migrate out of the region. Prefers to hunt low over water and among trees. Maternity colonies are now most commonly found in buildings and begin forming in April and May. Males with enlarged testes were collected in mid-July in the Long Pines (Jones *et al.* 1973); a maternity colony was found on 28 May in a barn in northeastern Harding County (Andersen and Jones 1971). This species was not detected during the 1994 survey, but may have been present at sites where species of *Myotis* were not distinguishable by calls alone.

Status: This species is one of the most common bats in North America and appears to be fairly common on the Sioux District (Andersen and Jones 1971, Jones *et al.* 1973). This species has been recorded from the Long Pines, North Cave Hills, and Slim Buttes (Appendix B4). The Little Brown Myotis is not listed by any federal agency.

Natural Heritage Program rank: G5; not on Species of Special Concern list in Montana or South Dakota.

Occurrences of *Myotis volans* on or near the Sioux Division, Custer National Forest



Species locations from the Montana Natural Heritage Program, May 16, 1995

atlas/maps/bat17.cmp

Long-legged Myotis (*Myotis volans*)

Description: A medium-sized (5-9 g) myotis; color of fur varies from reddish brown to nearly black. Ears are relatively short (8-16 mm), and blackish brown with rounded tips, just reaching nostrils when laid forward. Tragus is short with a small, rounded basal lobe. Calcar is keeled. Underwing is densely-furred to a line from elbow to knee.

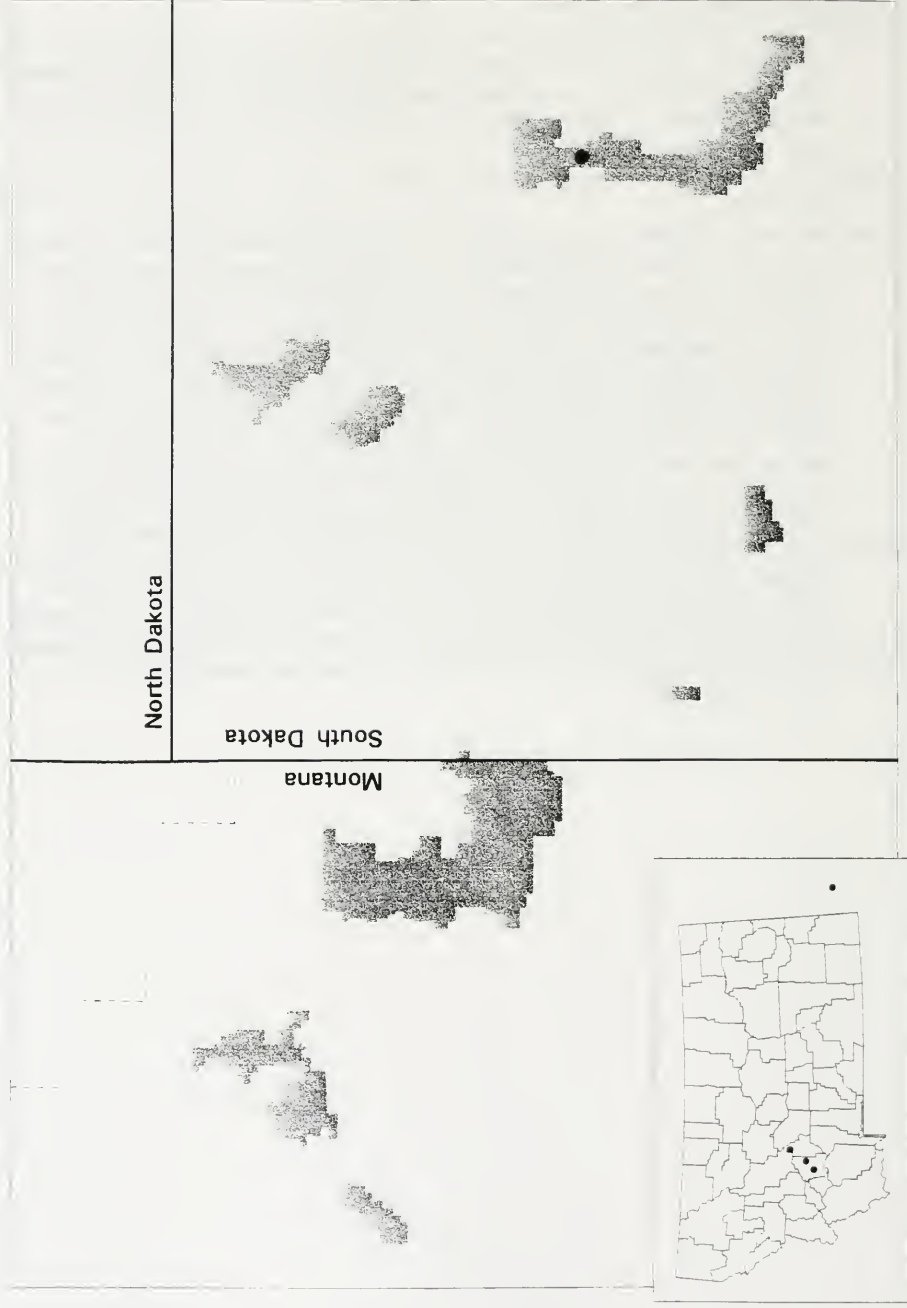
Distribution: From northern British Columbia south to central Mexico and east to the central Great Plains.

Habitat and Habits: Inhabits forested regions in both conifers and mixed conifer-hardwoods. Roosts in trees, rock crevices, mines, caves, cracks and crevices in stream banks, and in buildings. Caves and old mines are used as hibernacula. Swenson and Shanks (1979) found hibernating males in a mine in northeastern Montana in December; late November hibernacula have been found in the Black Hills (Turner 1974). In Carter and Harding Counties, females with enlarged uteri have been collected in late May, females with embryos in late June, and lactating females in July and early August (Andersen and Jones 1971, Jones *et al.* 1973, Lampe *et al.* 1974). Feeds over meadows and stream courses after emerging early in the evening. In 1994, two adult males were netted on 14 June over a pond at Reva Gap, Slim Buttes, and an adult female was netted on 16 June at Picnic Springs, North Cave Hills (Appendix B3).

Status: Considered the most common bat in Carter County (Jones *et al.* 1973) and common in Harding County (Andersen and Jones 1971). This species has been recorded from Ekalaka Hills, the Long Pines, North Cave Hills, and Slim Buttes. The Long-legged Myotis is a U. S. Fish and Wildlife Service candidate (C2) species for federal listing.

Natural Heritage Program rank: G5; S4 in Montana, not on the Species of Special Concern list in South Dakota.

Occurrences of *Myotis thysanodes* on or near the Sioux Division, Custer National Forest



Species locations from the Montana Natural Heritage Program, May 16, 1995

atlas/maps/bat16.cmp

Fringed Myotis (*Myotis thysanodes*)

Description: A medium-sized (5-8 g) large-eared myotis. Dorsal pelage varies from medium brown to pale buff, the individual hairs being grayish-black basally. Ears and membranes are blackish brown and often contrast with the pelage color; ears (17-21 mm) extend 3-5 mm beyond nostrils when pressed forward. Calcar without a distinct keel. A fringe of conspicuous pale, straw-colored hairs extends posteriorly 1-2 mm beyond the edge of the uropatagium.

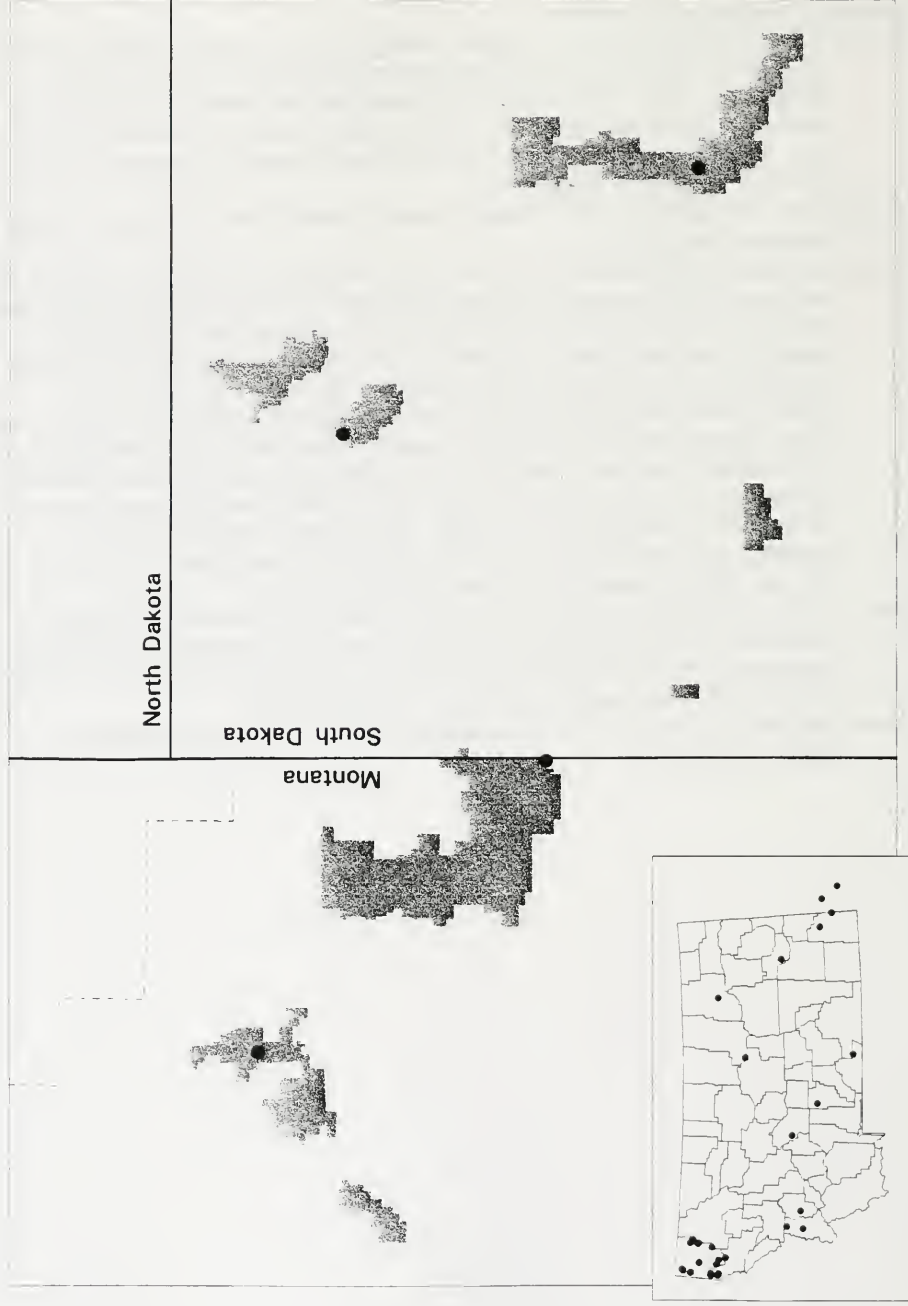
Distribution: From southern British Columbia south to southern Mexico and east to western North and South Dakota.

Habitat and Habits: This bat seems to prefer montane and upland forests, but also appears in desert scrub and some non-wooded areas, such as the Badlands of South Dakota (Jones and Choate 1978). The population in South Dakota (centered in the Black Hills) is isolated from the main range. Commonly roosts in buildings, but also uses caves and abandoned mines. Hibernacula include old mines and caves; this species is a year-round resident in the Black Hills (Turner 1974). Females form maternity colonies of up to several hundred individuals in summer. In the Black Hills (Turner 1974), pregnant females have been found in June, and lactating females have been found in late July and late August. These bats are often observed at dusk foraging along water courses and over standing water. In 1994, an adult non-lactating female was mist-netted over a pond at Reva Gap, Slim Buttes on 14 June (Appendix B3). This represents the first record of this species on the Sioux District.

Status: Not recorded from the Sioux District prior to 1994; year-round resident and not uncommon in the Black Hills (Turner 1974). This species has been recorded only from Slim Buttes on the Sioux District (Appendix B4). The Fringed Myotis is a U. S. Fish and Wildlife Service candidate (C2) species for federal listing.

Natural Heritage Program rank: G5; S3 in Montana, S2 in South Dakota on Species of Special Concern lists.

Occurrences of *Lasionycteris noctivagans* on or near the Sioux Division, Custer National Forest



Species locations from the Montana Natural Heritage Program, May 16, 1995

atlas/maps/bat21.cmp

Silver-haired Bat (*Lasionycteris noctivagans*)

Description: This bat can be distinguished from all other bats in the Northern Great Plains by its distinctive coloration. The dorsal pelage is long and blackish brown, "frosted" with silvery white. Membranes are blackish brown, ears are short (12-17 mm), rounded, and naked. The dorsal surface of the uropatagium is furred. Weighs 8-12 g.

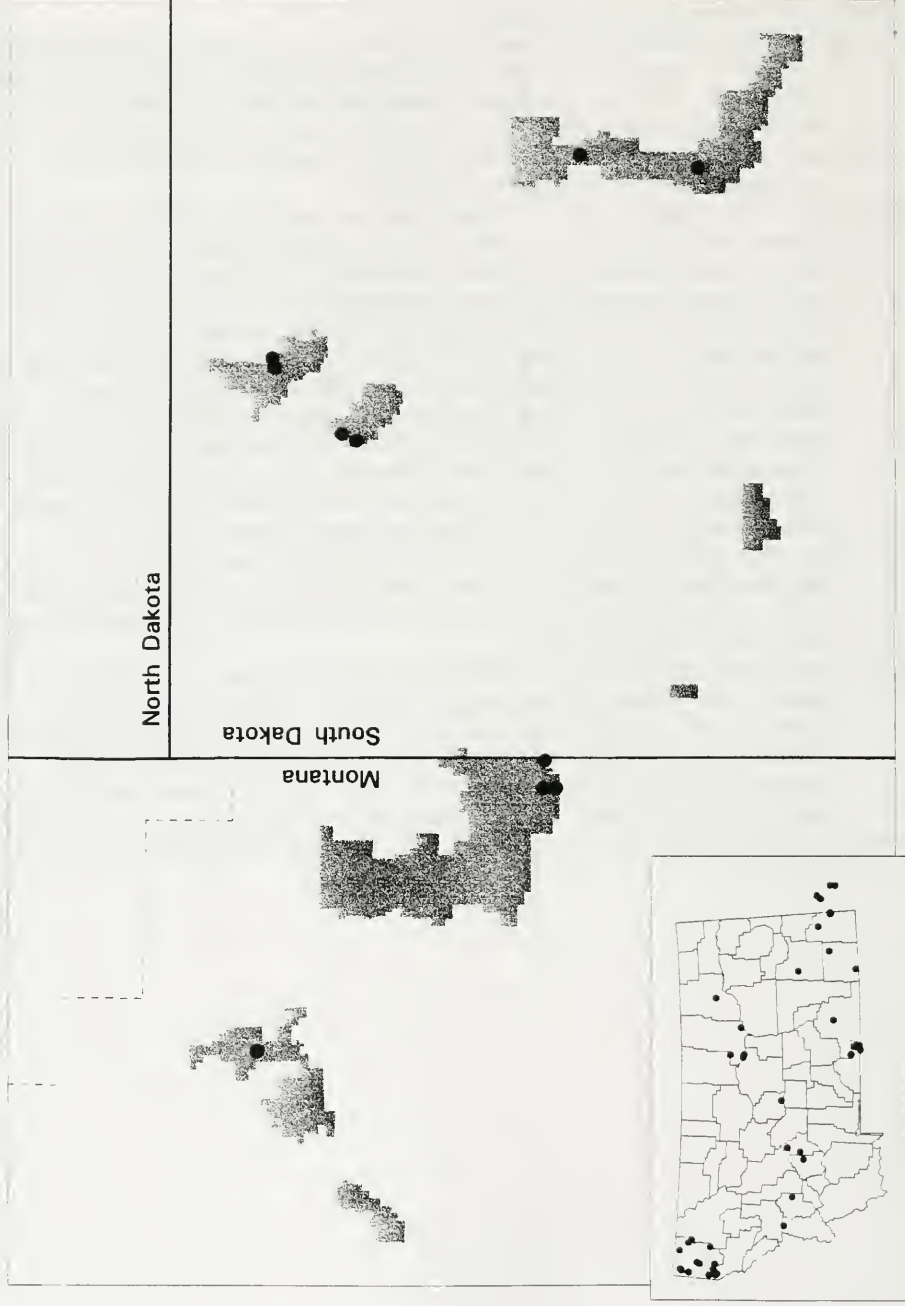
Distribution: Occurs throughout much of the United States and southern Canada north to southeastern Alaska and south to northern Mexico

Habitat and Habits: Found in a variety of forested habitats, sometimes in open country associated with stands of trees; preferably near ponds and streams. Few summer roost sites have been described, but probably roosts behind bark or in tree cavities. This bat is more common in buildings in autumn during migration. Hibernacula include tree cavities, rock crevices and buildings, infrequently in mines or caves. One torpid individual was found in a cave in November in the Black Hills (Turner 1974). This species is solitary, so it is rarely found in groups with more than 3-4 individuals. Mating occurs in autumn, and the young are usually born in June. Single pregnant females were collected on 1 June in the Slim Buttes (Andersen and Jones 1971) and on 12 June in the Black Hills (Turner 1974). Volant young and lactating females were caught in mid-July in the Long Pines (Jones *et al.* 1973). Emerges early in the evening to forage around street lights, among trees, and around standing water in a slow leisurely pattern low over the ground. In 1994, this species was detected on 13 June at Road Draw Spring #1, Slim Buttes, near a pond on 14 June in the Ekalaka Hills, on 15 June in the SE corner of the Long Pines, and on 28 September at Dry Creek Reservoir, South Cave Hills (Appendix B3).

Status: Considered a common summer resident in the Long Pines (Jones *et al.* 1973), and probably locally common in other Sioux District units. Most individuals probably migrate out of the region in autumn, as winter records are restricted to one hibernating individual in the Black Hills in November (Turner 1974). This species has been recorded from Ekalaka Hills, the Long Pines, North Cave Hills, South Cave Hills, and Slim Buttes (Appendix B4). The Silver-haired bat is not listed by any federal agency.

Natural Heritage Program rank: G5; not on Montana Species of Special Concern list, S4 in South Dakota.

Occurrences of *Eptesicus fuscus* on or near the Sioux Division, Custer National Forest



Species locations from the Montana Natural Heritage Program, May 16, 1995

atlas/maps/bat22.cmp

Big Brown Bat (*Eptesicus fuscus*)

Description: This species is easily distinguished from other bats on the Northern Great Plains by its large size (only the Hoary Bat is larger). Weighs 16-30 g. Pelage is brown, with hair extending only slightly onto the wing and tail membranes. Dark-colored ears are of medium size (12-19 mm); the tragus is less than half the length of the ear and is blunt. Calcar is usually keeled. Tip of tail extends about 5 mm beyond tip of uropatagium.

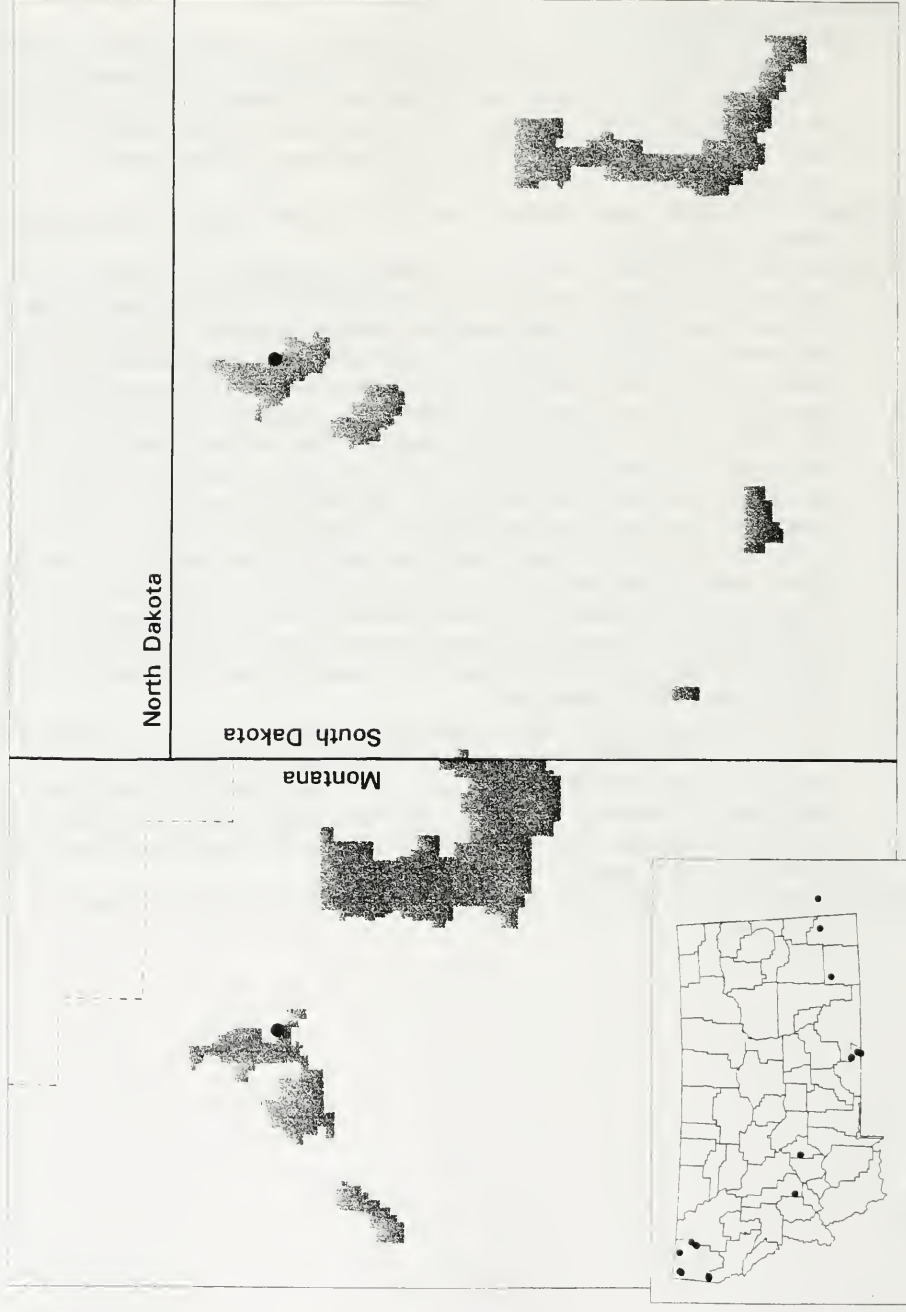
Distribution: Widespread across all of the United States and southern half of Canada south to northern South America.

Habitat and Habits: Found in a variety of wooded and semi-open habitats. Colonial, often forming colonies in tree cavities, rock crevices and buildings. Hibernacula include caves and mines, buildings (attics) and other man-made structures. Maternity colonies have been found in attics, barns (Swenson and Shanks 1979), and sometimes in tree cavities. Mating occurs in fall and winter. Pregnant females have been collected in the Long Pines, North Cave Hills, and Slim Buttes in late June; lactating females have been collected in early July, and volant young have been collected in mid-July and early August (Andersen and Jones 1971, Jones *et al.* 1973). Emerges at twilight to hunt for an initial period of about five hours, after which activity declines; often forages over meadows, around yard lights, and along tree-lined streets. In 1994 this species was detected on 13 June at Road Draw Spring #1, Slim Buttes, on 14 June (a lactating female and two adult males were netted) at Reva Gap, Slim Buttes, on 14 June in Ekalaka Hills, on 15 and 16 June near Capitol Rock and in the SE corner of the Long Pines, on 27 September at Pedalower Reservoir and Cabin Spring Reservoir, North Cave Hills, and on 28 September at Dry Creek Reservoir and on the rim crest, at South Cave Hills (Appendix B3).

Status: Considered the most common bat in southeastern Montana (Jones *et al.* 1973) and a common species in Harding County, South Dakota (Andersen and Jones 1971). Present year-round in the Black Hills (Turner 1974) and probably the same on the Sioux District. This species has been recorded from Chalk Buttes, Ekalaka Hills, the Long Pines, North Cave Hills, South Cave Hills, and Slim Buttes (Appendix B4). Not listed by any federal agency.

Natural Heritage Program rank: G5; not on Species of Special Concern list in Montana or South Dakota.

Occurrences of *Lasiurus cinereus* on or near the Sioux Division, Custer National Forest



Species locations from the Montana Natural Heritage Program, May 16, 1995

atlas/maps/bat24.cmp

Hoary Bat (*Lasiurus cinereus*)

Description: Can be distinguished from other bats by a combination of its large size (20-35 g) and distinctive coloration. Dorsal pelage varies from yellowish brown to mahogany, frosted with silver (imparting a "hoary" appearance). Hairs on the neck are longer than those on the back, forming a slight "ruff." The wings are furred outward to the level of the elbows, and the dorsal surface of the uropatagium is covered with dense fur. There is a yellowish white patch on each shoulder and a cream-colored spot near the wrist. Ears are short (17-20 mm) and broad, and the calcar is moderately keeled.

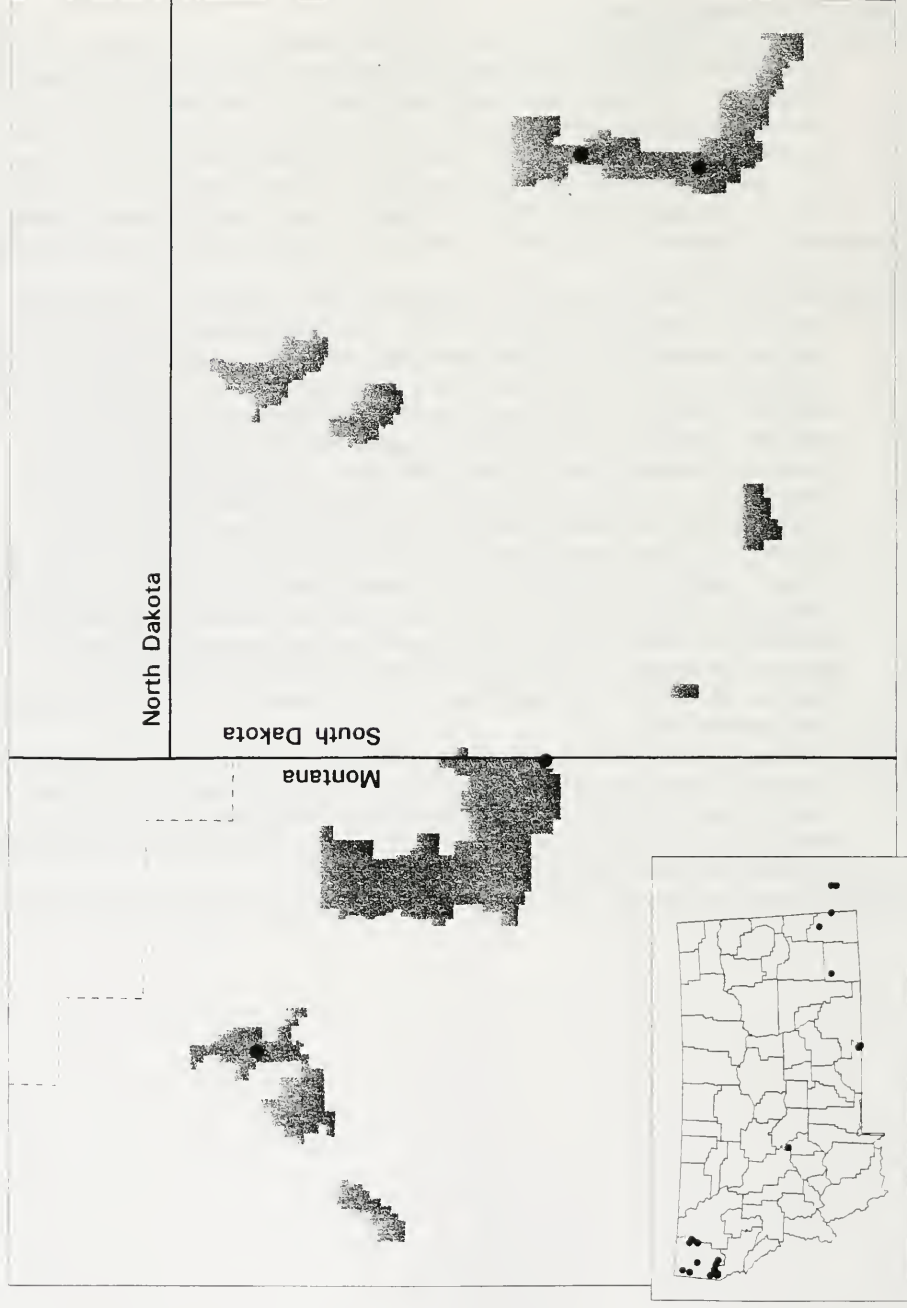
Distribution: Widespread across southern Canada south through the United States to northern South America.

Habitat and Habits: Occurs in many places during migration, but found in wooded habitats during the breeding season. Day roosts (about 3-5 m above ground) are mostly in trees, well-covered with vegetation above and open below; apparently both deciduous and coniferous trees are used. Enters caves and houses only rarely. Solitary or in small family groups during summer, although larger aggregations may form during migration. Mating may take place before migration or on the wintering grounds; females are pregnant by the time they migrate north. Lactating females and volant young have been collected in July in the Long Pines and Ekalaka Hills (Jones *et al.* 1973); pregnant and lactating females have been found in June in the Black Hills (Turner 1974). This species has not been found wintering in the region; there is a late autumn record from the Black Hills on 31 August (Turner 1974). Emerges later in the evening than other species and is a swift flyer. Flies low, occasionally impaling itself on barbed-wire fences. This bat regularly emits a chattering during flight that is audible to the human ear. In 1994, this species was detected on 27 September at Pedalower Reservoir, North Cave Hills, and on 29 September at McNab Pond, Ekalaka Hills (Appendix B3).

Status: A common summer resident in the Long Pines (Jones *et al.* 1973), but Anderson and Jones (1971) considered this species uncommon in Harding County, South Dakota. Locally abundant in the Black Hills (Turner 1974). This species has been recorded from Ekalaka Hills, the Long Pines, North Cave Hills, and Slim Buttes (Appendix B4). The Hoary Bat is not listed by any federal agency.

Natural Heritage Program rank: G5; not on Species of Special Concern lists for Montana or South Dakota.

Occurrences of *Plecotus townsendii* on or near the Sioux Division, Custer National Forest



atlas/maps/bat26.cmp

Species locations from the Montana Natural Heritage Program, May 16, 1995

Townsend's Big-eared Bat (*Plecotus townsendii*)

Description: Easily distinguished from other bats in the region. A medium-sized (8-12 g) bat with very long (30-39 mm) ears and two prominent masses on the lateral surface of the snout between the eyes. Wings and tail membranes are hairless, dorsal pelage is brownish with individual hairs grayish at the base and cinnamon to brownish at the tip.

Distribution: In western North America, from southwestern Canada to southern Mexico east to western Kansas, Oklahoma, and the Northern Great Plains; also in a narrow band in northern Arkansas east to West Virginia.

Habitat and Habits: Usually found associated with desert shrublands, pinyon-juniper woodlands, and dry coniferous forests. A cave dweller for both day roosts and hibernacula; also frequently found in abandoned mines in central and eastern Montana (Hoffmann *et al.* 1969, Swenson 1972, Swenson and Shanks 1979). A colony was found in late September in an abandoned farm house in Richland County, Montana (Swenson and Shanks 1979). Females form maternity colonies in warmer parts of caves and mines. Mating occurs in fall and winter. Disperses from large caves in late spring in the Black Hills (Turner 1974) to form maternity colonies in smaller caves and buildings; pregnant and lactating females have been collected in the Black Hills in July. Emerges well after dark and is a slow and agile flyer. Specimens have been collected in June and July from North Cave Hills and the Long Pines (Andersen and Jones 1971, Lampe *et al.* 1974). There is no current evidence of breeding on the Sioux District. Visher (1914) found this species in Ludlow Cave, North Cave Hills in September 1912, and one individual was collected there in June 1961. In 1994, this species was detected in the Slim Buttes on 13 June at Road Draw Spring #1 and on 14 June at Reva Gap, on 14 June in the Ekalaka Hills, and on 15 June in the SE part of the Long Pines (Appendix B3).

Status: Uncommon or rare in this part of the species range (Lampe *et al.* 1974), although a year-round resident in fair numbers in the Black Hills to the south (Turner 1974). Possibly a permanent resident in small numbers on the Sioux District. This species has been recorded from Ekalaka Hills, the Long Pines, North Cave Hills, and Slim Buttes (Appendix B4). Townsend's Big-eared Bat is a U. S. Fish and Wildlife Service candidate (C2) species for federal listing, and has U. S. Forest Service Sensitive status.

Natural Heritage Program rank: G4; S2 in Montana, S2S3 in South Dakota.

Species Not Located but Potentially Present on the Sioux District, Custer National Forest

Northern Long-eared Bat (*Myotis septentrionalis*, formerly *M. keenii septentrionalis*)

Description: Similar in appearance to *M. lucifugus*, but tips of guard hairs not so glossy.

Ears, when pressed forward, extend beyond tip of nose (rare for *M. lucifugus*). Calcar slightly keeled. Weighs 5-8 g.

Distribution: Northeastern North America west to British Columbia, Alberta, and western North Dakota south to the southeastern United States. This species is locally common in ponderosa pine habitat in the Black Hills (Turner 1974), using caves and old buildings as summer roosts. Lactating females have been found in the Black Hills in July and August; it may hibernate in the Black Hills. One record from Montana (Swenson and Shanks 1979); a hibernating adult male was found on 12 January 1978 in an abandoned coal mine in northeastern Montana, 45 km WNW of Fort Buford, North Dakota.

Status: Not listed by any federal agency.

Natural Heritage Program rank: G4; S2 in Montana, S3 in South Dakota.

Red Bat (*Lasiurus borealis*)

Description: Distinctive; dorsal pelage ranges from bright reddish orange to chestnut. Many dorsal hairs tipped with white, giving a frosted appearance. Dorsal surface of the uropatagium is well-furred. Ears are short, nearly naked, and rounded. Weighs 8-14 g.

Distribution: Southern Canada through the United States to northern South America. Resident in the Dakotas and Nebraska, but restricted in the western parts of these states to urban areas and wooded riparian habitat; roosts in trees as solitary individuals or small family groups. Migrates out of the region in the winter. In the Black Hills, a yearling female was captured on 29 July 1968, and a lactating female was caught on 20 August 1968 (Turner 1974). A single specimen, collected in the 1860's, exists for Montana, labeled "Yellowstone River"; the location could be in error.

Status: Not listed by any federal agency

Natural Heritage Program rank: G5; SR for Montana, not on Species of Special Concern list for South Dakota.

Spotted Bat (*Euderma maculatum*)

Description: Distinctive; huge ears (45-50 mm long), each shoulder and the rump with a large white patch surrounded by dark fur. Wings and tail membranes are naked and pinkish-red.

Distribution: Found in a wide range of habitats in the western mountain regions, most often in rough and rocky, semi-arid and arid terrain, varying from ponderosa pine forest to scrub country and open desert. Day roosts tend to be situated in high cliffs near perennial water. Occurs in the Pryor Mountains around Bighorn Canyon, Carbon and Big Horn Counties, south-central Montana (Worthington 1991); a single individual was collected previously in Billings, Yellowstone County (Nicholson 1950). Although

considerably west of the Sioux District, the distribution is poorly known and knowledge of Spotted Bat habitat requirements is fragmentary. For that reason the species is placed on the list of potential species.

Status: U. S. Fish and Wildlife Service candidate (C2) for federal listing; U. S. Forest Service Sensitive status.

Natural Heritage Program rank: G4; S1 in Montana, not known to occur in South Dakota.

RECOMMENDATIONS

- 1) Due to limited time in the field during the 1994 survey, the known status and distribution of bats on the Sioux District should not be considered as definitive. Although several collections of bats have been made in the area over the years, most field efforts have been brief (less than two months) and not comprehensive. The combined efforts of the various surveys are just beginning to reveal a more complete picture of the bat fauna of the region. Additional summer survey work should be done in all units, focussing on the Chalk Buttes, North Cave Hills, South Cave Hills, and East Short Pine Hills.
- 2) Ludlow Cave in the North Cave Hills should be surveyed once during the winter, to determine if it is presently used. Inspection should be done by experienced bat biologists to avoid awakening the bats and causing mortality. The literature suggests that this cave may be a hibernaculum for Townsend's Big-eared Bat. If used by bats, restricted visitor access to this site may be warranted, since some bats are sensitive to disturbance and may abandon a roost or hibernaculum. The cave was not surveyed in 1994.
- 3) Any abandoned coal mines and buildings on Forest Service land should also be checked for hibernating and summer-roosting bats if possible. Starvation Butte Caves (T1S R59E) in the Ekalaka Hills (see Campbell 1978) should be investigated in both summer and winter. Records should be kept of any hibernating or roosting bats found, including locality, species present, number, and date.
- 4) Life history information and ecology is poorly known for most bat species in the Northern Great Plains. Any specimens obtained should be preserved. Locality, date, and reproductive status should be documented. This is especially true for the Northern Long-eared *Myotis*, Red Bat, and Spotted Bat.
- 5) If Great Horned Owl or other owl roosts and nest sites are known, pellets could be routinely collected and examined for bat remains. A number of nocturnal raptors prey on bats opportunistically, and sometimes systematically. American Kestrels will also prey on bats, and their pellets could be examined as well.
- 6) Large trees with natural cavities should not be removed. Besides providing nesting and roosting sites for birds, some bats will use them for the same purposes.
- 7) Because bats are vagile, some species may go undetected unless routine and long-term monitoring is conducted. Such a program would be unprecedented in Montana and much of South Dakota, and could potentially provide a wealth of information on bat biology currently unavailable for this region.

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APPENDIX B1

FIELD FORMS USED IN BAT INVENTORIES

TYPE: Anabat ☐ QMC ☐ Other ☐
 Transect ☐ Point Count ☐ Random ☐
 Mist net ☐ (# & Size) _____
 Harp Trap ☐ Other _____
 Bldg ☐ Cave ☐ Mine ☐ Other _____

Observer _____

Start Date _____ End date _____

Site _____

(record site name and date on tape recorder)

Elevation _____ ft
 Wind Speed (Beaufort) ☐ Wind Direction _____
 Sky Condition ☐ Temp (C) begin _____ end _____
 Time begin _____ end _____

BAT SPP

Cover Type _____ (name)

--	--	--	--

Small Trees w/in 11.3 m (5-10 cm)

Medium Trees w/in 11.3 m (10-40cm)

Large Trees w/in 11.3 m (>40 cm)

Average Canopy ht. (w/in 30m to nearest 5m)

Canopy coverage (w/in 30m to nearest 10%)

Sapling coverage (w/in 30m to nearest 10%)

Seedling coverage (w/in 30m to nearest 10%)

Shrub coverage (w/in 30m to nearest 10%)

Bush coverage (w/in 30m to nearest 10%)

Grass coverage (w/in 30m to nearest 10%)

Snaq (>20cm dbh) abundance w/in 30m
 (0=none; 1=1-5; 2=>5)

Road w/in 100 m (0=no, 1=yes)

Edge w/in 100 m (0=no, 1=yes)

Riparian w/in 100 m (0=no, 1=yes)

Rock outcrop w/in 100 m (0=no, 1=yes)

Distance to water (meters)

Pond ☐ Lake ☐ Marsh ☐ bog ☐

Creek ☐ River ☐ Other _____

Comments _____

Beaufort Wind Scale

- 0 - wind speed <1 mph; smoko rises vertically
- 1 - 1-3 mph; wind direction shown by smoko drift
- 2 - 4-7 mph; wind felt on face, leaves rustle
- 3 - 8-12 mph; leaves & small twigs in constant motion, light flag extended
- 4 - 13-18 mph; rises dust & loose paper; small branches are moved
- 5 - 19-24 mph; small trees in leaf sway; crosted wavelets on inland waters

Sky Conditions

- 0 - clear or a few clouds
- 1 - partly cloudy (scattered or variable sky)
- 2 - cloudy (broken or overcast)
- 3 - fog or smoko
- 4 - drizzle
- 5 - snow
- 6 - showers

Metric Conversions

- 1 ft = 0.3048 m
- 1 m = 3.2808 ft
- 33 ft = 10.06 m
- 66 ft = 20.12 m
- for use with
topog. clinometer

Your Pacing

- 5 m = P
- 10 m = P
- 11.3 m = P
- 30 m = P
- 50 m = P
- 100 m = P
- 200 m = P
- 300 m = P

Cover Type Codes

10000. RESIDENTIAL LAND
10100. urban human dwelling ("block" on quad maps, non-native veg)
10200. rural human dwelling (structures in otherwise native vegetation)
20000. AGRICULTURAL CROP LAND
20100. irrigated cropland, rampoland, pasture
20200. dry cropland
30000. PASTURELAND
30100. grassland
30102. irrigated or lightly grazed (no evidence of well-worn cattle trails)
30104. heavily grazed by cattle (patches of bare soil, trails visible)
30200. saprophytic, shrubby
30202. heavily grazed or lightly grazed (no evidence of well-worn cattle trails)
30300. dry shrubland
40000. FORESTED LAND
40100. temperate woodland
40102. heavily grazed or lightly grazed (no evidence of well-worn cattle trails)
40200. ponderosa pine (>80%)
40300. Douglas-fir (>80%)
40400. western larch (>80%)
40500. mixed-conifer
40501. old-growth (snags down, soil-thinned, some huge trees)
40502. mature (multi-story, trees about 20-40 cm dbh)
40503. young (shrubs thinned, canopy closed, most trees <20 cm)
40504. overstory removed (multi-story, like mature but more open)
40505. group selection cut; recent
40506. group selection cut; low shrub 2nd-growth stage
40507. group selection cut; tall shrub/seedling 2nd-growth stage
40508. group selection cut; pole-sapling stage
40509. shrubland cut; recent
40510. shrubland cut; low shrub 2nd-growth stage
40511. shrubland cut; tall shrub/seedling 2nd-growth stage
40512. shrubland cut; pole-sapling stage
40513. seed tree cut; recent
40514. seed tree cut; low shrub 2nd-growth stage
40515. seed tree cut; tall shrub/seedling 2nd-growth stage
40516. seed tree cut; pole-sapling stage
40517. clearcut; recent
40518. clearcut; low shrub 2nd-growth stage
40519. clearcut; tall shrub/seedling 2nd-growth stage
40520. clearcut; pole-sapling stage
40521. post-fire (standing dead); recent (<5 yr)
40522. post-fire (standing dead); low shrub 2nd-growth stage
40523. post-fire (standing dead); tall shrub/seedling 2nd-growth stage
40524. post-fire (standing dead); pole-sapling stage
40600. spruce-pine (>80%)
40700. spruce-fir
40800. willow/elm/box
40900. cedar-hemlock
42000. aspen
50000. mixed conifer-deciduous mosaic (mohor, alomoni, conifers, a "land")
50000. RIVERLAND
50100. marsh, bog
50200. floodplain, wet meadow
50300. willow thicket (associated with broad, meandering rivers)
50400. alluvial bottomland
50402. desert shrub (rush, undergrowth, no visible browse line)
50500. streamside riparian (narrow strip of vegetation along perennial stream)
50501. riparian forest (densely vegetated, ungrazed stream bank)
50502. grazed by cattle (stream bank well and little vegetated)
50600. hardwood draw
60000. TUNDRA
60100. shrub tundra
60200. herbaceous tundra
70000. BARRIER LAND (the elevation transition mix of rock, conifer, shrubs)

BAT SURVEY FIELD FORM

DATE: _____

LOCATION: _____

LEGAL DESCRIPTION: _____

WEATHER:

(start/time)

(finish/time)

TEMPERATURE

WIND

CLOUD COVER

HUMIDITY

SITE CHARACTERISTICS:

VEGETATION (tree and shrub species, canopy coverage, size, density, distribution) -

WATER (stream width, depth, speed, bank cover, pond or lake size, emergent vegetation) -

LOCAL GEOLOGY (rock type, extent of outcrops or cliffs) -

CAVES OR ADITS (in vicinity?, status surveyed?)

Note: if bat survey is at a specific cave or adit, describe here and complete a cave inventory form

MIST NET (OR TUTTLE TRAP) RESULTS:

Number and sizes of mist nets set: ____ 18' ____ 30' ____ 42' ____ 60' ____ other ()

How/where set (trail, stream, canopy, pond, meadow, cave entrance, etc. - record number and setting):

Tuttle trap used? Y / N Where set: _____

Bats captured Y / N (Species, sex and number): _____

For each bat captured, record:

SPECIMEN NUMBER: _____ DATE: _____ LOCATION: _____

TIME of CAPTURE: _____ County, MT

1) Species: _____

2) Sex: M F Un 3) Age: Ad Juv Un

4) Reprod status: F: Lac / Non Lac, Grav / Postpartum, Unkn / None; M: Scrotal / Nonscrot

5) Weight: _____ grams Forearm length: _____ mm Other specific characteristics: _____

6) Comments (net type and height, condition of bat and markings/scars, collected or released):

.

For each bat captured, record:

SPECIMEN NUMBER: _____ DATE: _____ LOCATION: _____

TIME of CAPTURE: _____ County, MT

1) Species: _____

2) Sex: M F Un 3) Age: Ad Juv Un

4) Reprod status: F: Lac / Non Lac, Grav / Postpartum, Unkn / None; M: Scrotal / Nonscrot

5) Weight: _____ grams Forearm length: _____ mm Other specific characteristics: _____

6) Comments (net type and height, condition of bat and markings/scars, collected or released):

.

APPENDIX B2
SITES SURVEYED FOR BATS, SIOUX DISTRICT,
CUSTER NATIONAL FOREST, 1994

APPENDIX B2. Sites surveyed for bats on the Sioux District, Custer National Forest, Carter County, Montana and Harding County, South Dakota in 1994.

Unit	Location	Date	Survey Method ^a
Carter County			
Ekalaka Hills	T1N R58E S12 (cliffs near pond)	14 June	A
Ekalaka Hills	T1N R59E S19 (McNab Pond)	29 Sept	A
Long Pines	T3S R62E S14 (SE point on SD line)	15 June	A
Long Pines	T3S R62E S16 (Wickham Campground)	15 June	A
Long Pines	T3S R62E S16 (NW of Capitol Rock)	15 June	A
Long Pines	T3S R62E S21 (Lindsey Reservoir)	16 June	A
Harding County			
North Cave Hills	T22N R5E S15 (Picnic Springs, 2 sites)	16 June	A, M
North Cave Hills	T22N R5E S15 (Picnic Springs, rimrock)	27 Sept	A
North Cave Hills	T22N R5E S15 (Fuller Pass stock tank)	27 Sept	A
North Cave Hills	T22N R5E S26 (Pedalower Reservoir)	27 Sept	A
North Cave Hills	T22N R5E S27 (Cabin Spring Reservoir)	27 Sept	A
North Cave Hills	T22N R5E S34 (Upper Schleicht Res.)	27 Sept	A
South Cave Hills	T21N R4E S24 (Dry Creek Reservoir)	28 Sept	A
South Cave Hills	T21N R4E S26 (rim top in NE4)	28 Sept	A
Slim Buttes	T17N R7E S25 (Road Draw Spring #1)	13 June	A, M
Slim Buttes	T17N R8E S30 (E 1 mi. on FS-115 from spring #1)	13 June	A
Slim Buttes	T18N R8E S7 (Reva Gap Pond)	14 June	A, M
Slim Buttes	T18N R8E S7 (pond NW of Reva Gap CG)	14 June	A

^a A--ANABAT ultrasonic detector, M--mist net

APPENDIX B3
BAT OBSERVATIONS DURING 1994,
SIOUX DISTRICT, CUSTER NATIONAL FOREST

APPENDIX B3. Locations of bat species detected during 1994 field survey, Sioux District, Custer National Forest.

Species	Location	Detection ^a Method	Date
<i>Myotis</i> sp.	T1N R58E S12 (Ekalaka Hills)	A	14 June
	T3S R62E S14 (Long Pines)	A	15 June
	T3S R62E S16 (Long Pines)	A	15 June
	T3S R62E S21 (Long Pines)	A	16 June
	T22N R5E S26 (North Cave Hills)	A	27 Sept
	T21N R4E S24 (South Cave Hills)	A	28 Sept
	T21N R4E S26 (South Cave Hills)	A	28 Sept
	T17N R7E S25 (Slim Buttes)	A	13 June
	T18N R8E S7 (Slim Buttes)	A	14 June
<i>M. evotis</i>	T3S R62E S16 (Long Pines)	A	15 June
	T21N R4E S26 (South Cave Hills)	A	28 Sept
<i>M. ciliolabrum</i>	T18N R8E S7 (Slim Buttes)	M	14 June
<i>M. volans</i>	T22N R5E S15 (North Cave Hills)	M	16 June
	T18N R8E S7 (Slim Buttes)	M	14 June
<i>M. thysanodes</i>	T18N R8E S7 (Slim Buttes)	M	14 June
<i>Lasionycteris noctivagans</i>	T1N R58E S12 (Ekalaka Hills)	A	14 June
	T3S R62E S14 (Long Pines)	A	15 June
	T21N R4E S24 (South Cave Hills)	A	28 Sept
	T17N R7E S25 (Slim Buttes)	A	13 June
<i>Eptesicus fuscus</i>	T1N R58E S12 (Ekalaka Hills)	A	14 June
	T3S R62E S14 (Long Pines)	A	15 June
	T3S R62E S16 (Long Pines)	A	15 June
	T3S R62E S21 (Long Pines)	A	16 June
	T22N R5E S26 (North Cave Hills)	A	27 Sept
	T22N R5E S27 (North Cave Hills)	A	27 Sept

^a A--ANABAT ultrasonic detector, M--mist net

APPENDIX B3 (cont). Locations of bat species detected during 1994 field survey, Sioux District, Custer National Forest.

Species	Location	Detection ^a Method	Date
<i>Eptesicus fuscus</i>	T21N R4E S24 (South Cave Hills)	A	28 Sept
	T21N R4E S26 (South Cave Hills)	A	28 Sept
	T17N R7E S25 (Slim Buttes)	A	13 June
	T18N R8E S7 (Slim Buttes)	A,M	14 June
<i>Lasiurus cinereus</i>	T1N R59E S19 (Ekalaka Hills)	A	29 Sept
	T22N R5E S26 (North Cave Hills)	A	27 Sept
<i>Plecotus townsendii</i>	T1N R58E S12 (Ekalaka Hills)		14 June
	T3S R62E S14 (Long Pines)		15 June
	T17N R7E S25 (Slim Buttes)		13 June
	T18N R8E S7 (Slim Buttes)		14 June

^a A--ANABAT ultrasonic detector, M--mist net

APPENDIX B4

KNOWN DISTRIBUTION OF BAT SPECIES

SIOUX DISTRICT, CUSTER NATIONAL FOREST

APPENDIX B4. Known distribution of bat species on the Sioux District, Custer National Forest: Chalk Buttes (CB), Ekalaka Hills (EH), Long Pines (LP), North Cave Hills (NCH), South Cave Hills (SCH), Slim Buttes (SB).

Species	Carter County, MT			Harding County, SD		
	CB	EH	LP	NCH	SCH	SB
<i>Myotis</i> sp.		5 ^a	5	5	5	5
<i>M. evotis</i>	2	12	1235		5	3
<i>M. ciliolabrum</i>		2	12			35
<i>M. lucifugus</i>			12	3		3
<i>M. volans</i>		12	12	35		35
<i>M. thysanodes</i>						5
<i>Lasionycteris noctivagans</i>		5	125	4	5	35
<i>Eptesicus fuscus</i>	2	5	1235	35	5	35
<i>Lasiurus cinereus</i>		25	12	5		3
<i>Plecotus townsendii</i>		5	25	34		35

^a sources: Jones *et al.* 1973 (1); Lampe *et al.* 1974 (2); Andersen and Jones 1971 (3); Visser 1914 (4); 1994 field survey (5).

